International Journal of Surgery 34 (2016) 161–168

Contents lists available at ScienceDirect

International Journal of Surgery

journal homepage: www.journal-surgery.net

Original Research

Comparisons of clinicopathologic factors and survival rates between laparoscopic and open gastrectomy in gastric cancer

Dong Jun Kim [1, 2], Sang Hyuk Seo [1, 2], Kwang Hee Kim [*, 1, 2], Yo-Han Park, Min Sung An, Ki Beom Bae, Chang Soo Choi, Sang Hoon Oh

Department of Surgery, Busan Paik Hospital, Inje University, Republic of Korea

HIGHLIGHTS

- This study showed, in patients with gastric cancer, that laparoscopic gastrectomy is the safe and facilitative skill and is the safe and same result on the oncological aspect, by comparing open gastrectomy.

ARTICLE INFO

Article history:
Received 17 May 2016
Received in revised form
17 August 2016
Accepted 17 August 2016
Available online 26 August 2016

Keywords:
Gastric cancer
Laparoscopic gastrectomy
5-year survival rate
5-year disease-free survival rate

ABSTRACT

Purpose: This study examined the safety and facilitative aspects of laparoscopic gastrectomy, with respect to clinicopathologic factors and complications in patients with gastric cancer, in comparison with open gastrectomy. The study also compared the safety of laparoscopic gastrectomy, with respect to the 5-year survival rate and recurrence in terms of the oncologic results, with that of open gastrectomy.
Methods: This retrospective study included 424 patients with gastric cancer who had undergone gastrectomy at Busan Paik Hospital, Inje University, over a 5-year period from January 2010 to December 2014. The gastric cancer database, comprising data collected from the patients' medical records, was examined for the analysis of clinicopathologic factors, complications, survival rates, and recurrence.
Results: Of the 424 patients, 146 underwent laparoscopic gastrectomy and 278 underwent open gastrectomy. Differences were observed between laparoscopic and open gastrectomy with respect to clinicopathologic features such as tumor size, number of harvested lymph nodes, differentiation, T stage, N stage, TNM stage, lymphatic invasion, vascular invasion, and perineural invasion. The complication rates of laparoscopic and open gastrectomy were 4.8% and 4.3%, respectively, and the recurrence rates were 3.4% and 11.5%, respectively. The 5-year overall survival rates (OSRs) of laparoscopic and open gastrectomy were 90.5% and 85.9%, respectively, and the 5-year disease-free survival rates (DFSRs) were 90.2% and 75.6%, respectively, with significant differences. The 5-year OSRs of laparoscopic and open gastrectomy for stage I disease were 96.6% and 96.9%, respectively, those for stage II disease were 44.4% and 97.7%, respectively, and those for stage III disease were 75.0% and 61.7%, respectively. The 5-year DFSRs of laparoscopic and open gastrectomy for stage I disease were 95.4% and 96.9%, respectively, those for stage II disease were 60.6% and 84.9%, respectively, and those for stage III disease were 64.3% and 40.1%, respectively, with no significant difference.
Conclusion: This study showed that laparoscopic gastrectomy is a safe and beneficial modality compared with open gastrectomy in patients with gastric cancer. In terms of the oncologic results, laparoscopic gastrectomy is also considered safe and provides the same results as open gastrectomy.

1. Introduction

A highly effective national health examination drive and advances in diagnostic techniques have facilitated the detection of early gastric cancer (EGC), raising its prevalence from 24.8% to 57.6% over the last 20 years in the Republic of Korea [1]. Open abdominal

* Corresponding author. Busan paik hospital, Inje University, Bokgiro 75, Busanjin-gu, Busan, Republic of Korea. Tel.: +82 51 890 6352; fax: +82 51 898 9427.
E-mail address: inwoodog@naver.com (K.H. Kim).
[1] First author : Dong Jun Kim and Sang Hyuk Seo.
[2] Kwang Hee Kim, Dong Jun Kim and Sang Hyuk Seo contributed equally to this work.

http://dx.doi.org/10.1016/j.ijsu.2016.08.020
1743-9191/

gastrectomy and D2 lymphadenectomy were previously recognized as the only treatments for gastric cancer. However, as the number of EGC diagnoses has increased, the treatment approach has shifted toward various minimally invasive methods, such as endoscopic mucosal resection, endoscopic submucosal dissection, and laparoscopic gastrectomy [2].

Of these methods, laparoscopic gastrectomy has shown effectiveness similar to that of conventional abdominal gastrectomy, due to advances in surgical equipment and the enhanced expertise of laparoscopic surgeons. Furthermore, owing to advantages such as reduced pain, early recovery, cosmetic effect, and improved quality of life secondary to a short operative time, this surgical modality is becoming accepted as the treatment of choice for EGC, as opposed to open abdominal gastrectomy [3–6]. Various reports have suggested that laparoscopic gastrectomy is now the standard treatment for EGC along with open abdominal gastrectomy, due to the high level of safety and operative suitability of laparoscopic gastrectomy for EGC in comparison with open abdominal gastrectomy [5,7–9], and that the performance of laparoscopic gastrectomy concurrently with D2 lymphadenectomy is safe and easy [9–15,22]. With respect to the oncologic results, some clinicians have reported that laparoscopic gastrectomy is safe and provides results similar to those of open abdominal gastrectomy [5,16–28]. Based on these studies, prospective multicenter randomized controlled trials were conducted in Japan [31,32], The Netherlands [33], and the Republic of Korea [29,30]. In this study, a general surgeon with somewhat less experience in gastrectomy conducted a comparative analysis of the clinicopathologic factors and complications of patients who had been diagnosed with gastric cancer and had undergone open abdominal or laparoscopic gastrectomy. The investigation also attempted to evaluate the surgical safety and technical validity of these two operative modalities. Furthermore, the study also examined the safety of these two methods with regard to the oncologic aspect by comparing 5-year survival rates and recurrence of gastric cancer.

2. Methods

2.1. Subjects

This retrospective study targeted 474 patients with gastric cancer who had undergone gastrectomy performed by a general surgeon at the Busan Paik Hospital, Inje University, over a 5-year period from January 2010 to December 2014. Of the total number of patients, 46 patients who had stage IV disease at the time of surgery, 3 patients who had begun neoadjuvant chemotherapy before surgery, and 1 patient who expired due to myocardial infarction after surgery were excluded from the study. The gastric cancer database, which contained the patients' medical records, was investigated retrospectively to enable analysis of the clinicopathologic characteristics of these subjects. The 7th edition of the American Joint Committee on Cancer's guidelines was utilized for the TNM staging of gastric cancer in these patients [34].

The Institutional Review Board of Busan Paik Hospital, Inje University, approved this study (no. 15-0066).

2.2. Preoperative assessment and surgical method selection

Gastric cancer was diagnosed via gastroduodenal endoscopy at the Department of Digestive Medicine in our hospital or another local hospital. Endoscopic ultrasonography, abdominopelvic computed tomography (CT), and positron emission tomography (PET) were used to determine the clinical TNM staging and surgical method (laparoscopic or open abdominal gastrectomy). The indication for laparoscopic gastrectomy was restricted to cases with TNM stage cT1N0M0 or cT2N0M0. Consent was obtained after each patient had been sufficiently informed of the advantages and disadvantages of both surgical approaches. The final decision regarding the surgical approach reflected the patient's personal opinion. For patients with TNM stages other than those indicated above, and who strongly desired laparoscopic gastrectomy despite the strong recommendation of open abdominal gastrectomy, laparoscopic gastrectomy was performed out of respect for the patients' opinions.

2.3. Chemotherapy and testing for gastric cancer recurrence

Chemotherapy was not carried out for patients with stage I disease who had undergone gastrectomy. Fluorouracil (doxifluridine®) was administered to patients with stages II and III disease; however, 2013 titanium silicalite-1 or a combination of capecitabine and oxaliplatin (XELOX) was administered in some cases after consideration of each patient's general condition and metastasis to the lymph nodes. Chemotherapy was started 4–6 weeks after surgery, after the patient's general condition had been evaluated.

Recurrence studies, such as blood tests including tumor markers, chest X-rays, and abdominal CT, were conducted every 6 months, and gastroduodenal endoscopy was performed once a year. PET was carried out at regular follow-up observation examinations for recurrent cases and cases with symptoms indicative of recurrence, such as ascites, despite the lack of findings of recurrence in other tests during regular follow-up examinations.

The disease-free survival rate (DFSR) was calculated to the endpoint of local recurrence or distant metastasis of gastric cancer. The overall survival rate (OSR) was calculated to the endpoint of death due to gastric cancer.

2.4. Statistical analysis

SPSS version 19 (IBM Corp., Armonk, NY, USA) was used for statistical analysis. The independent-samples *t*-test and Mann–Whitney *U* test were used for continuous variables, and the chi-squared test was used to analyze categorical data. The Kaplan–Meier estimator was used to analyze survival curves, and the log-rank test was used to compare the survival distributions (or rates) of corresponding groups. P values < 0.05 were considered to be statistically significant in all cases.

3. Results

3.1. Subjects' clinical characteristics

Of the 424 patients enrolled in the study, 146 underwent laparoscopic gastrectomy and 278 underwent open abdominal gastrectomy (Table 1). Laparoscopic gastrectomy was converted to open abdominal gastrectomy in four cases: one case of splenic artery damage, two cases of adhesion secondary to previous duodenal ulcers that developed during treatment, and one case of adhesion (following repeated pancreatitis due to excessive alcohol consumption).

Among patients who underwent laparoscopic gastrectomy, the male:female ratio was approximately 1.7:1. Subtotal gastrectomy was performed in 133 cases, total gastrectomy was performed in 12 cases, and proximal gastrectomy was performed in 1 case. The mean tumor size was 22.2 mm, and the mean number of dissected lymph nodes was 35.6. Eighty-four cases showed well-differentiated or moderately differentiated adenocarcinoma, and 62 cases had poorly differentiated adenocarcinoma and signet ring cell carcinoma. The T stage, was T1 in 122 cases, T2 in 10 cases, T3 in